UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT TACOMA

ARKEMA, et al.,	)	Case No. CV05-5087 RBL
Plaintiffs,	)	Tacoma, Washington
vs.	)	June 12, 2007
ASARCO, INC., et al.,	)	
Defendants.	)	

TESTIMONY OF PAUL FUGLEVAND
TRANSCRIPT OF PROCEEDINGS
BEFORE THE HONORABLE RONALD B. LEIGHTON
UNITED STATES DISTRICT JUDGE

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June 12, 2007 - 11:48 a.m.

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PAUL FUGLEVAND, the witness, after being duly sworn testified as follows:

DIRECT EXAMINATION

BY MR. MYERS:

Q Mr. Fuglevand, Judge Leighton asked Dr. Floyd the question, "What does it mean to drive a cleanup? What is a driver?"

Now, we've heard a lot of testimony about SQOs and sediment remedial action levels and biological testing and so forth for the head of the Hylebos.

Can you tell us what your interpretation is or your definition is of a driver for the cleanup of sediments in the head of the Hylebos?

A Yes. The Commencement Bay ROD set as the goal sediment that had an absence of any biological effects. So that is the predominant driver in this whole thing -- is if you have biological effects, that will drive a cleanup. It sets forth surrogates, chemistry levels called SQOs that could be used to indicate the potential for the biological effect. It also

sets forth that you could have chemical concentrations at the SQO or as high as a level that would recover naturally in ten years. That is where this sediment remedial action level. So we have a threshold level at the SQO. And we have a higher concentration at this SRAL, the ten-year natural recovery. So if we look at the body of data, if we just have SQO types of exceedances, that indicates a problem where something may need to be done. If we have chemistry exceedances above this SRAL or if we have adverse biological effects, you have to do a cleanup. You don't have any choice.

So it's those situations where you have high chemistry or high biological effects that are above the level that you could apply natural recovery that are going to drive the need to dredge at a site over lower levels of concentration.

Q Now the 2000 explanation of significant differences referenced this notion of subsurface chemistry.

And how does subsurface chemistry factor into what drives the cleanup?

A One of the significant issues is if we're going to decide to dredge an area and we have to decide how deep we're going to dredge, we look at subsurface chemistry. And as soon as I take a three-foot layer off, now the stuff that was subsurface is now surface. So the concentration at depth now becomes an issue because I can't stop my dredging halfway in

concentrations that wouldn't meet the SQO. So one of the big factors of subsurface chemistry was that it said, how deep do we have to go before we meet the criteria? And what was found in the Hylebos Waterway and for pretty much most of Commencement Bay -- it was, dredge until you get to the native -- was the general approach put forth by EPA and the different cleanups.

And so again, it was -- the subsurface chemistry, when it becomes surface if you peel a layer off, it's now surface and it starts to drive how the cleanup is implemented.

Q Did these notions of the sediment remedial action level and biological testing also apply to what was found in the subsurface chemistry?

A Biological testing would have been an issue if we were going to leave the subsurface chemistry now as surface, as exposed. So it would have been considered in those situations.

Q And then as to what would drive the cleanup, if subsurface becomes exposed through various mechanisms, would the same analyses apply, such as the sediment remedial action level as compared to the SQO?

A Yes. If we were going to say, look at, let's dredge off the top three feet, now we're going to expose subsurface material that now becomes surface, then I would use the same approach. I would use the biological testing and the SQOs

and the SRALs to look at that new surface to decide whether or not I could leave that under the requirements of the ROD.

Q Did the 2000 ESD statement regarding subsurface, did that change the head of the Hylebos cleanup plan?

A No, it did not in the pre-remedial design evaluation that we did.

Q What was the date of the pre-remedial design report?

A I think the final document is November of 1999, and there were drafts in '98.

Q Then the ESD was 2000, I think late --

A August of 2000, I believe. Again in the pre-remedial design, we recognize the issue that if subsurface could get reexposed and brought to the surface, it would be a factor in determining cleanup areas. So the cleanup plan that's in the pre-remedial design evaluation report for the head of the Hylebos didn't change at all in the 2000 ESD. In fact, the 2000 ESD figure of the cleanup plan is our PRDE report figure that shows the cleanup areas. So there was no change.

Q What were the cleanup or remedial options available and how were they factored into what needed to be cleaned up or what drove the cleanup?

A The main components were either natural recovery, allow -- stop sources that were impacting the area and allow that area to naturally recover, to heal, from that contamination.

Q How would that happen? How would natural recovery occur?

A Well, one of the primary issues is burial, where the contaminated sediment gets buried by new sediment that's coming in. There is also mixing that occurs by the biological animals that mix the surface with a deeper material. There is also chemical degradation that can occur and change the nature of the chemistry. There is a multitude of different ways that you can transform that surface layer from being adverse to being not adverse.

Q So other than natural recovery, what other options were available for addressing contaminated sediments in the Hylebos?

A The primary options were either dig it up and take it to a disposal site, so it's no longer in the environment --

Q Dredging?

A Dredging, yes.

And the other would be to place a cap over it to isolate it from the biological community. Those were the two primary mechanisms available.

Q Was there also a mechanism called enhanced natural recovery that EPA adopted or endorsed?

A Yes. Enhanced natural recovery was first developed in Eagle Harbor in Puget Sound. It recognized that this natural sedimentation process that has been seen elsewhere to kind of heal the surface -- you don't have maybe a high sedimentation rate in all locations. So where you don't have a high

natural sedimentation rate, it would be augmented by placing some additional material at the surface and then allowing the natural process of mixing to, again, heal that surface. So enhanced natural recovery was allowed in areas where natural recovery was considered appropriate, but you didn't have enough sedimentation rate.

MR. MYERS: Your Honor, I'm changing subject.

THE COURT: Let's take our break and come back at 1:30. Court in recess.

(Court in recess.)

THE COURT: Please be seated. Mr. Myers, you may continue.

REDIRECT EXAMINATION

BY MR. MYERS:

Q All right. Mr. Fuglevand, Dr. Floyd testified that wood waste did not drive the cleanup of any areas in the neck of the Hylebos Waterway. In your opinion, is that accurate?

A No, it's not.

Q Have you produced some exhibits to explain why Dr. Floyd's position is incorrect?

A Yes, I have.

MR. MYERS: May I approach the witness?

THE COURT: You may.

BY MR. MYERS:

Q Mr. Fuglevand, you have in front of you what has been

marked as Exhibit Nos. 782, 781, and 780; is that correct?

A Yes, it is.

Q And are these the exhibits that you prepared?

A Yes, they are.

Q Why don't you tell us what the importance is of the information on Exhibit No. 780?

A 780?

Q 782, excuse me.

A 782 is a figure out of the PRDE report dated 1999. It's titled, Exceedance Factors and Biological Results For All Surface Samples in the Head of the Hylebos Waterway.

And what I have are two areas that I would like to talk about. One area is CO-12B up by the Arkema dock. And then CO-14 adjacent to Weyerhaeuser. I've shown each one of those areas on this map.

Q Okay.

So then, do we go to Exhibit No. 781?

A Yes. 781 is basically a blowup of what you see up at CO-12B.

Q What does this tell us as to the issue of wood waste being a cause of or driver of cleanup areas?

A CO-12B was an area so designated because of a unique characteristic associated with Arkema. It was the area where the capping was required due to a groundwater discharge. But it's also the location where we see in Sample 2119, where we

have numerous different chemical exceedances, but the biology test passes. And we see the same thing in HY-21. We have chemical exceedances but the biology passes. What that means by the Commencement Bay ROD, we've used the phrase "biology trumps chemistry."

The chemistry was, again, a surrogate for what might be a biological effect. But the biological testing wasn't a true end point. Here we see in Station 2019 many different compounds exceeding the SQO from the ROD, but we still have a chemical pass. And one of the -- in my mind, one of the most important pieces of information from this is to understand that just because you have a chemical exceedance of an SQO doesn't mean you have toxicity. It means you may have toxicity. And for example in this case, the arsenic has an exceedance factor of 14. That means the arsenic concentration of this sample was 14 times higher than the SQO, and still no biological effect. And the reason is that that CO-12B we're dealing with is a very different form of arsenic in the groundwater versus what was associated with the Asarco slag used on a lot of log yards.

Q What's the other chemical that you have underlined here?

A The second chemical I have is fluoranthene. It's one of the PAHs that exists throughout the waterway. And in this case again, no biological effects associated with this sample. And an exceedance factor of fluoranthene of 2.2.

And that will become an important reference point as we talk about CO-14.

Q Do you want to go the next Exhibit, 780?

A Yes.

Q What's the importance -- first off again, what is shown here on Exhibit No. 780?

A Again, 780 is a blowup taken out of Exhibit No. 782. It's CO-area 14. And in the upper right-hand corner you can see CO-14 and the area outlined, and you can also see that there are three surface samples that existed on this map in CO-14.

The most -- one of the more significant ones is Sample 1143 S, which is real close to the Weyerhaeuser log haul-out area. And the reason I considered this important is that it was a station of much discussion in the pre-remedial design. It only had one chemical exceeding the SQO, and that is fluoranthene, at an exceedance factor of 1.68. And again, compared to the other station where we had an exceedance factor on fluoranthene of 2.2, but we have a very severe biological exceedance in MCUL.

Q So your comparison is that in Section CO-12B, you had a number of chemicals including fluoranthene at an SQO exceedance of 2.2, yet that passed the biological testing, passed all the biological tests, yet over here in CO-14 near the Weyerhaeuser log ramp, you have a sample station, 1143, that only has one chemical above the SQO, fluoranthene, and

the concentration is below the concentration in the prior station in CO-12 at which there was no biological failure, correct?

A That's correct.

Q And it says here "MCUL biological exceedance." What does that mean?

A The MCUL is out of the Sediment Management Standards, Maximum Cleanup Level standard. That's the -- one of the methods for designating a biological result. And it implies that it exceeded the severest criteria, which meant cleanup was certainly mandated. Again from a driver perspective, an MCUL exceedance mandates a cleanup and is a driver of a cleanup.

Q Is there anything else you would like to discuss on Exhibit No. 780?

A Just the fact that there was considerable discussion with the agency over these results. And there was additional studies done on wood waste that looked into its distribution and its extent and its effects. It was part of the factor that drove EPA's decision to require wood waste cleanup, and here we see that wood waste was a very clear driver in CO-14.

Q Now, Dr. Floyd produced some exhibits that compared sediment chemistry with bathymetry at different sampling locations or stations. Have you seen those?

A Yes, I have.

Q Have you prepared some slides that analyze Dr. Floyd's positions or conclusions?

A Yes, I have.

MR. MYERS: May I approach the witness?

THE COURT: You may.

Q Mr. Fuglevand, handing you what's been marked as Exhibit Nos. 784, 785, and 786.

A Yes.

Q First, looking at Exhibit No. 784, what does this exhibit show us, Mr. Fuglevand?

A 784 is a Floyd and Snider -- Dr. Floyd, exhibit that I have marked up with some review marks.

Q What are the review marks that you've made and why did you make them on this exhibit?

A One of the things I wanted to look at was the presence of what chemicals are present in CO-14, to get an idea of what chemicals were drivers in CO-14. And so what I did on this figure is I struck out all of the cores that were not from CO-14 and then bounded in a green line the cores that were from CO-14 so I could get a better understanding of chemicals present in CO-14.

Q Why did you look at cores as opposed to surface samples?

A The surface samples we used to establish an area that needs to be cleaned up. And then when we look at cores, we start to look at the effect of -- chemicals have on the

cleanup.

We talked earlier about if we have chemicals three feet down, we can't just dig three feet and stop. We have to dig deeper because of the presence of those chemicals. And also the disposition after dredging, where we can go with the material is affected by what is in the subsurface.

Q Was there one surface sample in this set that was in CO-14?

A Yes. If you look at the bottom of the second column of chemistry, HOWB 14, that is a surface sediment grab. That is not a core. And that is a distinctly different type of sample from the cores. So I did not include that sample in my analysis. It is from CO-14, but it is not a core. And, in fact, the concentrations of the chemistry there are all in the natural recovery range of concentrations. So it wasn't a driver location, even if it was -- it didn't have chemistry that drove the cleanup.

Q Okay.

So what did you find in looking at these cores for the samples that were actually in CO-14?

A For the boxes surrounded by green in the top left corner --

Q That would be the two CO-5 boxes on the left-hand column and the two WS-4 boxes on the center column?

A That's correct.

Q Okay.

A What I did is I went through and I first identified all the PAH compounds. And then I was going to identify nonPAH compounds. The PAH compounds are identified by the blue lines. As you can see on the drawing, all of the compounds in these cores are PAHs. There are no other chemicals, there are no -- there is no mercury, no arsenic, there is no PCBs. 100 percent of the compounds that exceed criteria are PAHs, and there are several PAHs with very high exceedance factors, you know, well outside of the range that would be allowed by EPA to remain unremediated.

Q What did you do next, Mr. Fuglevand?

A The next exhibit I have is my Exhibit No. 785, where I took Dr. Floyd's Exhibit No. 647 and again, I simply identified the cores that were from within CO-14. You can see those are bounded by a green box in the lower center portion of the page, and their locations are identified by the red lines pointing up into CO-14. And I then took that part of this drawing and I enlarged it on a subsequent drawing, Exhibit No. 786.

Q Let's go to 786. What does this show regarding chemicals in the CO-14 area?

A Again, I went through the same exact process of identifying PAH compounds and other compounds. And of the 50 chemistry tests shown on -- in the green box, 48 are PAHs.

96 percent of all the compounds in the cores at CO-14 are PAHs. There are two samples that are not PAHs. And in the right-hand column at the top, CO-10, the very first listed is arsenic with an exceedance factor of 1.23. I put a green square next to that. And then halfway down, you see total PCBs with a 1.27 exceedance factor. I put a green dot there.

And one of the important things to recognize is that if we took all of the PAHs out of CO-14, if we took all the wood waste out of CO-14, we're left with one sample of arsenic and one sample of PCBs that are both in the natural recovery range. There would be no reason to do any remediation in CO-14 simply for the PCBs or the arsenic. They are not drivers at all. They have no impact on the clean up. The cleanup requirements in CO-14 were driven totally by the presence of wood waste and the presence of the PAHs.

Q Now, Dr. Floyd testified that PAHs and PCBs were commingled, and at least implied that each caused the requirement to clean up sediments in CO-14.

Do you think her statement was accurate?

A No, not at all.

Q Why not?

A Because it contradicts the data. The data in her own figure that shows that the PCB concentration is very low. Again, it's in the natural recovery range. And the PCB number is very low, in the natural recovery range, and it's

isolated. We find it only in one of these four samples, and at very low concentrations.

Q Let's switch topics here a little bit.

Dr. Floyd also attributed all PCB detections to General Metals, and stated that General Metals was the only known source of PCBs to sediments in the head of the Hylebos.

Do you think her statement to that effect was accurate?

A No, not at all.

Q Okay. Why not?

A Because of -- information I've seen relates to Kaiser Aluminum, where there is evidence of, one, PCB releases on the Kaiser Aluminium property.

Number two, we see PCBs present in the Kaiser Ditch that drains from the Kaiser property.

And number three, during the years that I worked with the HCC, Kaiser expressed concern over PCBs -- Kaiser PCBs being in the waterway.

So those three factors all -- you know, support my thought that it wasn't just General Metals PCBs, that there was clearly a PCB issue associated with Kaiser, as well.

Q Were there PCB detections off the Kaiser Ditch discharged in the sediments?

A Yes, there were.

Q All right. Now let's switch to another topic and try to move along.

Let's talk about bathymetry. Have you seen the cross-sections that Dr. Floyd prepared, comparing different bathymetry surveys from 1985 through the year, I think, 2004?

A You mean 1965?

Q 1965. Thank you.

A Yes, I have.

Q Do you have an opinion, Mr. Fuglevand, regarding whether Dr. Floyd's methodology of trying to compare these various bathymetric surveys is an appropriate methodology?

A Yes, I do.

Q What's your opinion?

A My feeling is she goes -- draws conclusions way beyond the value of the data. That she is drawing conclusions that the data does not support, and the data does not provide substantive documentation for. It goes, to my mind, almost into the realm of speculation rather than actual evaluation of the data.

Q How so?

A She's drawing specific conclusions about locations and volumes from the data without having a good clear understanding of the reliability and the variability of that data. And so in so doing, she's drawing conclusions that are far more precise than the data would allow.

She also does something -- to me that seems quite strange. She relies heavily on 1972 data, but a key part of the 1972

survey is missing. Key to her, in that it's for CO-14 at the log ramp. The reason there wasn't a survey in 1972 is there was an operating business at the log ramp that didn't allow access to the survey vessels. So she goes and takes data from 1971 and merges it with the 1972 data.

Q Why is that inappropriate under these circumstances?

A The 1971 data is what we call a pre-dredge survey. It's a conditioned survey before dredging. So it's gathering information on the bottom before a dredging event. 1972 data is after a major dredging event. There is 70,000 yards that are removed from dredging adjacent to CO-14.

We know that after dredging, not just here but, you know, on all or most marine projects, after dredging you get sloughing occurring. And you get material moving down slope because the dredging removes -- the toe of the slope removes the buttress that holds that slope in place. So if she's taking data from 1971, pre-dredge, and then merging it into a post-dredge survey, it's a false impression of what is there.

To me, an analogy would be if you wanted to map forestry coverage, and you fly a airplane over an area, take an aerial photograph of that, and you map where the forest is. And let's say we do that in 1971, and then we issue logging permits for that area. So then the area becomes heavily logged over the next year.

Then you come back in 1972, you want to take another

aerial photograph to see where the forest is, but a third of the site is covered with clouds. So your aerial photograph only shows you the part where there is no clouds. But a key part of your site is where there weren't any -- where the cloud cover was. You take the picture from 1971 and you Photoshop it into the 1972 picture, and you say, look at all the trees that are here in this part in 1972, when in fact, you don't know. And you draw conclusions based on an issue that is not only don't you know, but it's probably been adversely affected by the logging that went on and it gives a very false impression.

That is to me is very analogous to what she's done by merging pre-dredge data and post-dredge data into the same map and calling it a baseline.

Q Mr. Fuglevand, have you seen a study done by John Herzog, Dr. Floyd's former partner, from the Hydrographic Journal? It's Exhibit No. 766 in this case?

A Yes, I have.

Q What is the important information that is gleaned from that 2005 study?

A Well, Mr. Herzog in his study says that if you're going to compare hydrographic survey data from two points in time, even in the best case you can be no more accurate than plus or minus a foot or a foot and a half.

And he says in there that if you make -- if you have data

where the comparison is less than a foot, you can draw no conclusions on that. And that's in what I would call more of a controlled best case, where they took multiple surveys under very tight control for this study. And that's very different than when we're doing actual hydrographic surveys in different points in time. We don't have the same crews, we don't have same weather conditions, we don't have the same experience, we don't have the same methods, we don't have the same equipment.

And so Dr. -- I mean, his study shows that the best certainty you can have is plus or minus a foot. My experience is it can be far less than plus or minus a foot.

Q Dr. Floyd testified that the Army Corps of Engineers does bathymetry survey comparisons to measure dredging volumes.

Are you familiar with the Corps' handbook on hydrographic surveys?

A Yes, I am.

Q Did Dr. Floyd apply the Corps' methodology correctly?

A No, she did not.

Q Why not? Or how not?

A In the Corps manual, they talk about different types of hydrographic surveys. They talk about the fact that if you're going to use -- if you use different methods, you have to be very aware of the nuances of each method and how changing components can dramatically change your answer. Dr.

Floyd isn't aware of any of those issues. You know, cone angle for fathometer, the frequency, what was the positioning method for the boat, multiple factors that can have a dramatic impact on the outcome. By not knowing and factoring in all of those components, her analysis was not at all consistent with what is laid out in the Corps manual.

Q Dr. Floyd claims that if you establish a bathymetry line for more than 30 years ago, here 1972 bathymetry line, that you can assume that it remains accurate for the 30 years following to calculate deposition rates and volumes.

Is that accurate from your experience, Mr. Fuglevand?

A No, not at all.

Q How so?

A First, and probably the most obvious, is following 1972 and 1976, Weyerhaeuser did dredging. And they dredged below the '72 line, so that '72 line didn't remain unchanged. It was actually altered by a Weyerhaeuser contractor in 1976.

The other thing we have is in 1972, you take a post-dredge survey right after dredging. And as we've talked before, when you take away the toe of the slope, for the next year you're going to have sloughing of the slope and changing of the side slope. None of that is accounted for, in assuming that '72 doesn't change.

Thirdly, you have onsite operations that can also cause scouring of the bottom and distort the bottom and change it.

And fourthly, her assumption assumes that the '72 survey is correct. It assumes that it is exact, where we know in the world of hydrographic surveys, it's approximate. And we can see variations of feet from survey to survey. And so that assuming that it is correct is also an invalid assumption to do the analysis by.

Q From your experience, how accurate was the deepest historical dredging data for the head of the Hylebos?

A In places, it was fairly accurate as far as predicting the interface. And it was mainly in the navigation channel in the flat part of the site where that cut was fairly uniform, anyhow. As we got into side slopes, we saw more variations. The most -- I think one of the most severe variations we saw was in CO-14.

Q Dr. Floyd said that the area in CO-14 -- do you recall the HHCG in CO-14 had to dredge much deeper than the deepest historical bathymetry indicated?

A Yes, I do.

Q If I recall your testimony previously that that extended to five or more feet below the anticipated deepest historical dredge line; is that correct?

A That's correct.

Q Dr. Floyd testified that in that area, in CO-14 where this wood waste -- where this material went much deeper, that it only accounted for about 500 cubic yards of material.

Do you agree with her statement?

A No, not at all.

Q Okay. Why not?

A The dredge we were using at the time had a production rate of around 100 cubic yards an hour. So 500 yards would mean that we only had five hours of time when we were dredging deeper than the deepest historical. And that wasn't the case. We had days, and at a production rate of couple thousand yards a day. You know, that is several thousand cubic yards at a minimum.

At that site, CO-14, a foot of sediment at CO-14 is around 2500 cubic yards. And so if we had, for example, five feet of over dredging -- that's 12,000 yards. So her number of 500 yards is not even within the range that I would see as reasonable for that.

Q Do you know what the material was in this area that was five feet or more deeper than anticipated?

A Yes.

Q What was that material?

A We were seeing a -- predominantly a wood waste-type material as we dredged deeper.

Q Now let's switch subjects again. Judge Leighton has asked us to address the question of what wood waste dredging volumes and cost would have been in the neck if no chemicals were present. Have you evaluated this issue?

A Yes, I have.

Q Have you prepared a PowerPoint that will assist you in your testimony?

A Yes, I have.

Q Your Honor, we would like to use Exhibit No. 783, Mr. Fuglevand's PowerPoint.

Mr. Fuglevand, if you would direct me through the slides?

A This is the first slide in my PowerPoint. And this to me is the definitive point where EPA says clearly that wood waste in the head of the Hylebos waterway has to be remediated.

Q What is this document?

A This is a letter from EPA to me as project coordinator for the HHCG, dated November 3, 1998.

Q It's Exhibit No. 418 in this case.

A Okay.

Q Would you like me to proceed?

A Yes, go to the second page. This is top of page 2, and I believe there's some important statements here.

On the first line it says, "The enclosed map shows areas where the Wood Debris Group found wood debris accumulations which will require remediation."

So EPA isn't staying which will require further study and consideration. It says will require remediation.

Then they say some of these areas are already shown as

remediation areas in the HCC's technical memorandum, but much of it is not currently slated for remediation in the HCC reports, which said that much of the wood debris area was not envisioned for cleanup until this point in time when EPA issued this letter.

And then if you go to the next paragraph, first line, it says, "Both the areas shown in yellow and gray in the attached map will require remediation." Again, EPA is being very clear on requiring remediation.

And then on the last sentence, they talk about calculating the cleanup volumes in the PRDE report, which is what was done in the PRDE report.

Next slide.

Q The next slide -- this is that yellow and gray map that EPA was referring to in the November 3, 1998 letter?

A Yes. Wood Debris Group prepared this map showing the yellow, gray, and green areas. EPA included a map -- they included a version of this map in their letter. I didn't have a color version of that map. In the map that EPA includes with the report, they only show this portion, the neck, you know, of the colored area. But it's the same map, the colored portion, as this map here.

Q Your next slide, what does your next slide show?

A This is from a figure in the PRDE report, that again, 1999, that is implementing that directive by EPA, and the

areas in blue are the areas that, based on the prior map from EPA, are the areas that were then designated as Hylebos Wood Debris sites, areas that required cleanup. And in that report, I've repeated the note. It said, "High surface wood accumulation area, clean surface," and by clean surface, I meant from a chemistry perspective and chemicals at depth.

And so when I was asked to come up with an analysis of if it was wood debris only, what would that be? That was -- that was generated through the PRDE process. It was identified that these areas -- you'll note that right in between this blue area, there is a gray area that isn't in this drawing part of it, because that was an area that was already driven by chemicals. The other blue areas didn't have chemicals present, and so, again, it was a subset of the area that EPA identified that I carried forward as Hylebos Wood Debris site for analysis.

This next table are the volumes that were calculated for those blue areas, HWDS 1, 2, and 3, and it totaled 100,000 cubic yards of material associated with those sites. So we had an analysis and a volume from PRDE that I was able to use for this analysis today.

Q What does your next slide show?

A Now that I have a volume, I need to come up with unit costs for this analysis for dredging. And recognizing that I'm not looking at it as a Superfund site with all the

associated requirements, I'm now looking at it as a wood debris removal.

So then I turn to the Wood Debris Group's actual cost and I turn to Mr. Recker's testimony of early June, where he reports a PSDDA cost, an open-water disposal cost that includes dredging and disposal of $58.81 per yard, and for an upland cost $120.55 per cubic yard. And so those are the unit prices that I then used for my cost analysis.

Q Dr. Floyd just used the PSDDA cost of $58.81. Why did you also include the upland or landfill cost of $120.55?

A Well, the actual experience, and here as well as other sites, is not all wood debris can go to PSDDA. There is a component that has to go upland. And when it goes upland it's at a different unit cost than if you go to landfill.

Q Let's go to the next slide. What does this slide show as wood debris disposal with the landfill?

A I now needed to come up with an estimate of how much, in this hypothetical analysis I'm doing, how much is going to go to landfill and how much is going to go to PSDDA. So I turn to, again, wood debris documents, and this is the 93,000 yards that were handled at Manke. They found that one-third of the material went to landfill, two-thirds went to PSDDA. And I used that distribution in my cost analysis.

Q Did you look at other data to evaluate whether this two-thirds PSDDA/one-third landfill figure was appropriate?

A Yes, I did.

Q What did you do? What did you look at?

A I looked at some of the Weyerhaeuser data. And, you know, at the Weyerhaeuser, their DMMUs -- I believe out of four DMMUs, three of them failed PSDDA with low chemistry, but simply because of biological testing.

Then I looked at the volumes at Weyerhaeuser, and the proportion was not a lot different. I think at Weyerhaeuser they had a little bit higher percentage going to landfill than to PSDDA. But it seems like using Manke was reasonable. It wasn't the extreme number. It was a reasonable number. And I decided to use the Manke numbers.

Q What did you do next?

A Then I simply did the arithmetic. Where I took the cost per cubic yard from Recker for either PSDDA or landfill. I took the 100,000 yards and assigned one-third landfill, two-thirds PSDDA. And then I did the arithmetic to get the cost for total cost of dealing with the wood debris material identified by EPA in 1998 at 7.9 million.

Q Was that the end of your analysis?

A No, it was not.

Q What did you do next?

A The next thing I did was to take a look at what would be an offset from the Dunlap settlements. And again, the Dunlap settlement is a Superfund process. We're now talking about

just a straight wood waste process. So I'm mixing apples and oranges here, Superfund versus long. But, again, to get a sense, I brought in the Dunlap settlements, property settlements, about 1.8 million, and then I said not all of that goes to wood waste.

When I did my -- when I did my allocation, I only assigned half of the cost at CO-13 by Dunlap to wood waste. I assigned the other half to chemical. And so I did the same here. I used the same metric, the 50 percent, and applied 50% of the settlement that Dunlap -- to possibly wood waste costs. I came with $890,000.

Q Going to your next slide, your last slide?

A This is my final slide, where I do the final arithmetic, where I take the dredge and disposal cost of 100,000 cubic yards of 7.9 million. I select -- I then subtract the wood waste share of the Dunlap settlement of about 890,000. I come to a net wood waste dredge and disposal cost of a little over $7 million for the work that was defined in the EPA document of 1998.

And then I also flagged that this number is not a Superfund number. This was just wood waste only. It does not include Weyerhaeuser's chemical share at CO-14. It does not include allocation for any of the orphan shares. And it doesn't include any of the preconstruction costs by the HHCG, the HCC or the PCW.

Q Lastly, Mr. Fuglevand, can we pull up Exhibit No. 765, please? What is Exhibit No. 765, Mr. Fuglevand?

A This is a request for qualifications for consultants to work for the Department of Natural Resources to investigate the Woodard Bay Aquatic Restoration Site that's owned by DNR.

Q Okay. Do you know where Woodard Bay is?

A It's south Puget Sound.

Q Did your company receive this request for qualifications from the Department of Natural Resources?

A We downloaded it off the Web. When we review requests for qualifications, we reviewed this request and downloaded it.

Q Now, Dr. Floyd testified that creosote pilings have not driven a remedial action. How does this Woodard Bay request for qualifications apply to that testimony or that statement?

A I think if you go to -- is it the second page?

Q Let's go to the second page, please, at the bottom part.

A Go to the third page.

Q If you can go back, back to the second page, blow that up, if you would please, Jesse. Let's give this context.

Under the heading, Problem Overview, it says, "The Weyerhaeuser Timber Company operated the South Bay Log Dump from 1928 until 1985, during which time hundreds of thousands of logs were dumped into Henderson Inlet, rafted together and tugged to B Mill in Everett, Washington.

"When DNR purchased the property in 1988, we inherited

many of the 'improvements' associated with the dump, including, the 3,000 foot pier that crosses Chapman Bay, the railroad trestle crossing Woodard Bay, and many of the pilings and dolphins."

Did I read that accurately?

A Yes, you did.

Q Okay. So now let's go to page 3. If you could blow up the second and third paragraphs.

Is this what you wanted to discuss, Mr. Fuglevand?

A Yes, it is.

Q Okay.

What does this section -- if you could read this into the record, please.

A It says, "The thousands of creosote-treated pilings at Woodard Bay are also believed to negatively influence the health of the aquatic ecosystem. Creosote is a mixture of detectible hydrocarbon compounds. Approximately 80% of creosote is composed of polycyclic aromatic hydrocarbons, PAH. There are 16 PAHs known to be acutely and chronically toxic to marine animals, and several of these are found in creosote. Most of the PAHs can degrade into carcinogenic, tetrogenic, and mutagenic intermediaries during metabolism." And then, in parenthesis, "Brooks 1997."

Q And then in the next sentence it says, "As part of this project, DNR is interested in determining the nature and

extent of contaminated sediments." Correct?

A Correct.

Q The last question, Mr. Fuglevand, you've been asked about various opinions that you have in your testimony today, but also in prior days.

Are your opinions that you've expressed here in court based on a reasonable degree of scientific or engineering certainty?

A Yes, they are.

MR. MYERS: No other questions. Thank you.

THE COURT: Mr. Klein?

CROSS-EXAMINATION

BY MR. KLEIN:

Q Mr. Fuglevand, I believe you said in response to a question about plaintiff's Exhibit No. 784 that you were looking at that to try and determine what the chemicals were in CO-14 to get an idea what chemicals were drivers in CO-14. Do you remember saying that?

A Yes, I do.

Q Let's put up Exhibit No. 535, page 153. And before I go further, I just want to fix some locations in our minds.

You recognize this, don't you?

A Yes, I do.

Q Do you see this area over here, CO-2B?

A Yes, I do.

Q Okay. And you see that it's right next to the General Metals graving slip?

A Yes, I do.

Q Okay. And do you see CO-5A, down here?

A Yes, I do.

Q Okay. CO-10, here?

A Yes, I do.

Q Okay. And CO-12, of course.

A Yes, I do.

Q CO-3, over here?

A Uh-huh (affirmative).

Q Is that a yes?

A Yes, it is.

Q And, of course, we know CO-13 and CO-14, right?

A That's correct.

Q Let's go to -- I think it's page 329 in this document. Instead of talking about chemicals on the surface, let's talk about the ones you actually found during your dredging, okay?

Do you remember this table, here? Table B-1?

A This is Table B-1. It's a summary of the Type 3 analytical data in the head of the Hylebos. And the Type 3 data were the samples we collected immediately behind the dredge when they had removed the bulk of the material and thought they may be done with the dredging activities. So we would collect samples and analyze it for a subset of

indicator chemicals on each sample.

Q Okay.

So the Type 3 samples that you just went through are close to the bottom; isn't that right?

A Yes. When they were collected, they were close to the bottom, yes.

Q Okay.

So, I'm sorry for how we have to do this, but let's go through it and maybe I need to have my hard copy.

A Do you have a copy for me, as well?

Q Well --

THE COURT: Do you want my copy? What exhibit number was it?

MR. KLEIN: It's 535, Your Honor.

THE COURT: A or --

MR. KLEIN: I'm sorry. It's A-535.

THE COURT: He's got it.

BY MR. KLEIN:

Q Okay.

Are you on the first page?

A I'm on page 1 of 12.

Q All right.

And you see that there is a column for PCBs, do you not? Right there.

A I see the PCB number, yes.

Q Okay.

And I identified it on the screen with a red arrow. We're in the same place. And then, you have Total PCBs column, and then you have Flags, and then you have EF column next to it, correct?

A That's correct.

Q And it's shaded in green all the way down except where there is some yellow or brown marks, correct?

A That's correct.

Q And that carries through all 12 pages, correct?

A What carries through all 12 pages?

Q The green shading that I just talked about with the intermixed yellow and brown highlighting?

A Well, I need to look, so I'll do that. So the shading in that column all the way through, yup, I see what you're talking about.

Q Okay.

The green shading shows the exceedance factors for PCBs that were found in the Type 3 samples that were taken in all the COs that were dredged. Isn't that what we're talking about?

A Yeah, but the green shading was for samples where the EF was less than one. And there was other colors, so when you talk about green shading, it's predominantly green, but there are other shadings, as well.

Q Right. The yellow shading within the column is for PCB exceedance factor between one and two, correct?

A No, that's not correct.

Q Okay.

Well, why don't you tell me what it is, then?

A If you look at the top of the drawing, there is a key right up there, right at the very top. And on the left it says "PCB Key."

Q Yeah.

A If you look down the yellow, for the yellow, it says "1.0 is less than exceedance factor is less than or equal to 1.5."

Q Oh, that's on the 450 standard. But I'm talking about on the 300 standard to the right. Do you see where it says "1.0 is less than EF is less than 2.0"?

A There are two different subjects. On the left we have the EF for PCBs only, because PCB was the only human health-driven one.

On the right we have a different key for all other chemicals. And so it only applies -- the All Other Key are all other chemicals. The left is for PCB Key, the right is All Other Chemical Key.

THE COURT: With respect to this chart, if we disregard the colors, are the numbers accurate in the column?

BY MR. KLEIN:

Q Yeah. Well, first of all, following -- asking that

question, in the total PCB column, are the numbers there accurate and are they in parts per billion?

A So the numbers are accurate, the numbers that are presented in the EF are not parts per billion. Those are just exceedance factors.

Q I'm just asking you about total PCB column. Are the numbers there accurate? Let's ask that one first.

A Yes. The numbers there are accurate.

Q And are they in parts per billion?

A The numbers are represented in parts per billion, dry weight, yes.

Q Then if you look over to the EF column, what it's showing you there is the exceedance factors, correct?

A That's correct.

Q And the green shaded ones are measuring against a 300 standard for PCBs, 300 parts per billion, correct?

A Yes.

Q So if it shows a 1 there, it means there is 300 parts per billion, correct? A 1.0.

A If you look at the key up above, it says for green, for PCBs, an EF equals 1.0, parentheses, 300 parts per billion. So that's what the key says.

Q And the yellow, where it says 1.4, will indicate you're exceeding the 300 parts per billion standard by 1.4, correct?

A By 1 .4 times, correct.

Q That's all I've been asking.

If you look at the brown one -- let's say you see exceedance factor of 2.1 on this first page. It means that it's exceeding the exceedance factor of 300 parts per billion by 2.1 times, correct?

A That's correct.

Q Now, this could take some time, but you opened this area up. And I'm sorry, we're just going to have to go through some of these.

If you'll look down to the first yellow shaded one in CO-8, you see 1.4, don't you?

A Yes. I see a 1.4 by sample A-25 PO-3.

Q Okay. And CO-5A, you see a 2.1, don't you?

A In B-3P O1, which is also in CO-5A, I see 2.1, yes.

Q Okay.

And just four below that, in CO-5A, you see a 1.1, don't you?

A Yes, I do.

Q Okay.

So this shows that CO-8 and CO-5A have PCB exceedances, right?

A It shows that CO-8 has a natural recovery level, PCB exceedance, and it shows that CO-5 has an SRAL exceedance.

Q And they're all showing exceedances of the 300 parts per billion PCB SQO, aren't they?

A Yes. If it's colored anything but green, it's higher than the PCB SQO of 300.

Q Okay.

Go to page 2. You see another brown highlight for CO-8, don't you?

A Yes, I do.

Q That shows 1.5 exceedance factor, correct?

A That's correct.

Q Okay.

Let's go over to page 3. You also see exceedances for PCBs of 1.2, 1.0, in CO-5A, don't you?

A Yes, I do.

Q And 2.7, 2.3, 2.8, 2.9 for CO-8A, correct?

A I believe that's a 6A.

Q What did I say?

A You said 8A.

Q CO-6A. Excuse me. Correct?

A For CO-6A, yes.

Q Okay.

Next page. In CO-5B there is an exceedance factor of 1.9 for PCBs; isn't that correct?

A That's correct.

Q Next page. Page 5. Do you see the exceedance factor of 5.3 in CO-6B?

A Yes, I do.

Q You see the exceedance factor of 3.4 for CO-6B?
A Yes, I do.
Q Let's go to CO-10. Do you see an exceedance factor of 1.4?
A Yes, I do.
Q In CO-11, do you see an exceedance factor of 7.1?
A Yes, I do.
Q On page 6, now, do you see the results for CO-14 in the middle of the page?
A Yes, I do.
Q Okay.
The first one shows an exceedance factor of 1.1 for PCBs, doesn't it?
A Yes, it does.
Q And an exceedance factor for arsenic of 1.1, correct?
A So where is the arsenic? We're in PCBs.
Q Arsenic is two columns to the right.
A Okay.
Q Do you see that?
A Okay.
Q That sample was taken in Lane G; is that correct?
A Let me look.
Where are you getting Lane G from?
Q All the way to the left-hand side where it says "Type 3 Sample ID," it says "G-29." Isn't that the designation

within CO-14 where that sample was taken?

A So it would be in CDMA G-29.

Q Let's go back to Exhibit -- or page 153 in this document.

THE COURT: I've got G-29 on my document. It's in the upper left. It's the northeast corner of CO-14.

BY MR. KLEIN:

Q Right. I wanted to establish that, if we could go back to page 153 in this document --

THE COURT: I'm sorry, the northwest corner. Sorry.

BY MR. KLEIN:

Q Why are you smiling and nodding?

A I just think this is -- I've been through this before.

Q Yeah, okay.

Do you see G-29, right there? Northwest corner, as the judge said.

A Right there.

Q Okay. And just for future reference -- so that is Lane G across here, correct?

A Yes, it is.

Q And then there is Lane H across here, correct?

A That's correct.

Q And then there is Lane SS, correct?

A Correct.

Q SS-129, et cetera. Then SS-2 is here, correct?

A That's correct.

Q SSs are sometimes also referred to as SOs; is that correct?

A I'm not sure on that.

Q Okay.

So let's now go back to where we were at A-535, page 334.

Continuing on in CO-14. We have the next PCB exceedance for 1.3 is, again, in G-29; do you see that?

A Okay. I see you're there.

Q What depth were those samples taken at, by the way?

A What do you mean by "depth"?

Q Well --

A What do you mean by depth? Depth.

Q Well, at the time they were taken, where were they in terms of relationship to mean, low, lower water?

A It was highly variable. It depended on where you were at on the site, as far as where you were at with respect to MLLW.

Q Okay.

Well, were these samples -- you said they were taken during Type 3 sampling, which was near the bottom. Do you know how much above the final bottom they were taken?

A No, I don't.

Q Do you have any idea?

A Well, I know that wherever -- if you look in the second column from the left, where it says "Final Sample," if there

is an X there, then that sample was taken after the last dredging. So there was no more dredging after any sample marked with an X.

So we could go back then and look at our bathymetric maps and we could estimate that. We could also go to the sediment sampling database daily logs and we could see they took measurements of water depth for every sample collected.

So we could go back and we could then pull out of that the depth -- you know, below water surface of where each sample was taken. But that data doesn't show up on this figure.

THE COURT: Let's me ask a question. In relation to native, how far -- what distance above native qualified for Type 3 testing?

A The way the dredging was done, with the observer in the dredge, they dredged an area, and based on the observer's log, the observer's daily operations, it was generally that they had dredged to native, and they had found native, and then they were coming back. And Type 3 samples are really testing the residual.

THE COURT: So this is after they suspect they're at native?

A Yeah. They're at native and what they're really dealing with now is that residual layer, that mixed layer of inches to feet or whatever of all the mixed-up sediment. It's not part of an in situ original deposit. It's been highly

disturbed and it's loose and a residual material.
Mr. Fuglevand, when you looked at -- when you talked about plaintiff's Exhibit No. 786, and you pointed to the sample at C-10, do you remember that?
A Yes.
Q How deep was that sample taken?
A Can I look?
Q Sure.
A It's on -- isn't it -- if you look at the top, it tells you -- the first line, it tells you the depth.
Q Zero to 30.5 centimeters?
A Okay. So that's the depth that it was caught.
Q So how many inches is that?
A 30 centimeters is a foot.
Q So you were making the point that the PCBs are 1.27 and the arsenic at 1.23, that the sample that was taken there at the surface couldn't be chemical drivers for CO-14, correct?
A Yeah. And said that the data on that table showed that based on that table, it was not a driver.
Q And now I'm showing that PCBs -- well, you also said that there is -- that PCBs are not commingled and intermixed throughout CO-14, like Dr. Floyd said. And I've just showed you data showing that down near the bottom you've got PCBs exceeding the 300 parts per billion exceedance factor; isn't that correct?

A I didn't say that they weren't commingled. What I said is that they weren't commingled on drivers, as I showed on that map.

Q I'm sorry, I don't understand the difference. They weren't commingled as drivers?

A Well, you know, on the figures that I showed, I was using Dr. Floyd's figures. I was using her data. I took her data that she prepared for this case, and on her data it showed pretty much of an absence of PCBs in the investigation core borings. It showed that based on that, there wasn't.

Now, PCB data, after dredging, I can speak to that. And if you have questions, I can clearly speak to that.

Q But that's exactly my point. What you were showing earlier was stuff near the top during the investigation phase, and you weren't talking about what the actual data showed from the actual real-world dredging that was done.

A No. I was replying to information submitted by Dr. Floyd. As it was said in my testimony earlier, I was raising issues about her documents. And I was specifically speaking to her documents and not to the entire project. And if we have questions about the entire project, I can certainly speak to those, as well. But it wasn't that I was, you know, as you're alluding to. I was simply responding to Dr. Floyd's documents and speaking directly to them.

Q Let's go on a little bit.

We're back on page 6 of this table, B-1. And now just to finish out this page, in CO-10, 11, and 12A, there are a variety of PCB exceedances, aren't there?

A So what page are you on, now? Look at the bottom, at the page numbers.

Q It says page 6 of 12.

A Thank you. I'm there.

Q Okay.

We're leaving CO-14, and we're going down to CO-10, 11, 12A. There are a variety of PCB exceedances there, aren't there?

A Yes, there are.

Q Including one at 5, one at 5.2, and one at 4.0; is that correct?

A I see a 5.2 and 4.0, yes.

Q By the way, just to make another point before we leave this page, if you go back up to CO-14 below the 1.1 and the 1.3 exceedance factors, there are other data showing the presence of PCBs even though they don't exceed SQOs; isn't that correct?

A Yes. We're reporting wherever we have a detected level of PCBs, there is numerous numbers that are reported below -- exceedance factor below 1, yes.

Q Right. But they still show there are PCBs present, even though they don't exceed the exceedance factors, correct?

A Yes. It shows PCBs are there. They're not driving anything, but they're certainly present.

Q They're certainly present throughout CO-14, and at places you'll get exceedances, correct?

A There are PCBs throughout the entire Hylebos Waterway and throughout the entire Upper Hylebos. In fact, the indicator compound used for the cleanup for Type 3 PCBs were used across the entire site, because they were known to exist across the entire site.

Q And let's keep going on page 7. Do you see the exceedance factors for PCBs in CO-12A and CO-12B at the top?

A Yes, I do.

Q And then you get down in more of the middle of the page, CO-14, there is another exceedance factor for PCBs of 1.1; do you see that?

A Yes, I see that.

Q That is in H-28; do you see that?

A It looks like an H-29 to me.

Q Excuse me. H-29.

H-29 is Lane H, right next to G-29 that we looked at previously, correct?

A That's correct.

Q All right.

And then you see CO-3. This is the first time I think we've seen CO-3 has an exceedance factor of 2.1; do you see

that?

A Yes, I do.

Q CO-4 has an exceedance factor of 2.3, correct?

A Yes. Second line from the bottom, is that what you're referring to?

Q Yes.

A Okay. Yes, I see that.

Q And those are both opposite CO-14 basically; is that correct? CO-13 and CO-14 are opposite CO-3 and CO-4?

A CO-3 is at the end of the neck, next to the Turning Basin. CO-4 is the at the other end of the neck, next to the Upper Turning Basin. So I don't know -- yeah, roughly, they would be --

Q They're across the waterway?

A Yes.

Q Then we have CO-10, we have a PCB exceedance factor of 17.4; do you see that?

A No, I don't. Where are you?

Q The next page?

A Oh, on the next page. Sorry. Okay, I see that, yup.

Q I'm going to start skipping some of these. But you still see exceedance factors in CO-5B, CO-11, don't you?

A Yes.

Q CO-12B, you see large exceedance factors, correct?

A Yes.

Q Then down near the bottom, you see that 5.0 exceedance factor for CO-14?

A That's correct.

Q And that's on the side slope that's in area CDMA 129, correct?

A Yes. SS-129.

Q And then right above it, there is an exceedance factor of 1.1 for PCBs, correct?

A That is correct.

Q How about on page 9. If you look -- I'm going to skip some of these. If you look down at bottom there, CO-2B has a PCB exceedance factor of 2.8; do you see that?

A Yes, I do.

Q And then it has another exceedance factor of, just four lines from the bottom, of 2.0; do you see that?

A Yeah. And the one above, I don't know if it's 2.8 or 2.6.

THE COURT: 2.6.

BY MR. KLEIN:

Q I need magnifying glasses, sorry.

And then on the next page, page 10, you've got CO-2B with additional exceedance factors. At the top we have 2.8, and then a 7.9, correct?

A I see those two values, yes.

Q Then continuing down there is more exceedances for CO-2B, correct?

A That's correct.

Q I see, down near the bottom, we see one for 5.7, 4.7, 5.3; is that correct?

A That is correct.

Q All right.

Let's go back to page 153, which was our diagram. I want to ask you a follow-up question.

You were talking about Kaiser being a source of PCBs to the waterway. Now, we've shown PCB exceedances in -- could we go just back to the overall view, please. We've shown PCBs in CO-14, CO-4, CO-3, CO-2B, I think, or at least CO-2A, CO-5 area, CO-6, 10, 11, 12.

Are you claiming that those PCBs came from Kaiser?

A I never said that.

Q Okay.

Now, it would be kind of strange, wouldn't it, for anyone to conclude that those PCBs came from Kaiser, when EPA never identified Kaiser as a PCB source at this site after years of study, wouldn't it?

MR. MYERS: Objection, assumes facts not in evidence.

THE COURT: Overruled.

A Based on my experience at the site, it would be crazy to assume or to claim that the PCBs came from any one source at the head of the Hylebos. They're widely distributed. They're ubiquitous.

We have issues of known use at many properties around the site. We found PCBs at different concentrations at multiple properties.

I never made any kind of inkling that it all came from Kaiser, but I said it appears that Kaiser is a source and there are other sources, as well. And there is information in the record -- EPA didn't review all documents to draw their conclusions, and there is information in the record that shows PCB spills at Kaiser, and it shows a pathway.

There is a pathway from Kaiser to the Hylebos, and there is PCBs in the Kaiser Ditch, and there are discussions with Kaiser personnel that led me to believe that it's reasonable that PCBs -- some came from Kaiser. We just went through all the Type 3 samples. The highest concentration of Type 3 samples in CO-14 is at the mouth of the Kaiser Ditch.

The body of data points to multiple likely sources of PCBs in the Hylebos Waterway, which is no different than most of the industrial waterways in the United States. PCBs are a ubiquitous driver in the vast majority of sites across the country, and I haven't seen any evidence at this site to say that it is any different than other sites that I have worked on in that regard.

Q So are you claiming that General Metals is not the most probable source of the PCBs around the areas that I just pointed out?

A Yes. There is no evidence whatsoever that General Metals is the source of PCBs throughout the Hylebos Waterway. There is more evidence pointing to other sources of PCBs than there is to General Metals.

Q I'm not asking about throughout the waterway. I'm just asking about the areas where I put the red arrows.

A You have red arrows throughout the entire head of the Hylebos Waterway. We went from CO-4 all the way down the waterway and showed PCBs. My experience is those PCBs have come from multiple sources that are not easy to differentiate.

But we've seen high concentrations at multiple locations without a gradient. We have seen high locations there, (indicating), we've seen high locations in this area, we've seen high locations -- concentrations here. We've seen high concentrations there, we had operations, for example, at the Hylebos marina, that has a lot of dumping issues going on there.

There is a real body of evidence that says multiple sources of PCBs are very likely to this waterway, and they're not clearly defined or differentiated. But there is no evidence I've seen that points to a single source. We don't see gradient information. We don't see transport information that would say it could be General Metals. That is contradictory to the body of evidence that exists on this

site.

Q Are you claiming that even the evidence showing PCBs in CO-2A and where you pointed in CO-2B also doesn't point to General Metals as the source for those areas?

A I mean, it's proximal. In that case we're seeing proximal to General Metals.

One of the things that was done -- I mean, there was $10 million worth of studies done on Hylebos Waterway. It was not to study the sources as far as allocation goes. It was to identify a cleanup project.

And these studies were not directed towards who can we hang the cost with. It was a Superfund project to define nature and extent. So I haven't done any studies or been involved in any studies that would go back upstream and say these PCBs came from this property. But I have observed and worked with the data, and have not seen any clear distinct pattern that would say there is a source -- you know, a single source that has impacted the waterway. That data does not present itself at all.

So we can speculate about the PCBs in 2B. We can speculate about PCBs. But I have no data on which to do that besides just pure speculation. I haven't done that analysis. And I haven't seen the data prepared to do that analysis.

Q Let's go to plaintiff's Exhibit No. 784. Do you see 1101 here, Station 1101, on this exhibit?

A Yes, I do.

Q You crossed it out.

A Yes, I did.

Q Tell me why you crossed it out.

A Because, as I said, I was looking at the cores that are located within CO-14, to look at chemical drivers within CO-14.

Q Now this is at Station 140, is that correct, where this core was located?

A No. The cross-section -- and that is a distinction. The cross-section is drawn at 140. The cores are not all located on 140. They're pulled from different locations, and you can see that on the other drawing, 785. You can see where 1101 is, and it looks like on 1101, it's probably 139 plus 50, something like that. It's clearly within CO-13.

Q Okay.

But the interpretation of the core samples extends more than just the point where the actual core was located. It extends outward in both directions; isn't that correct?

A I -- you may, but that's not what I did. I looked at the data and saw what the data stated. I wasn't doing any extrapolations or suppositions. I was simply looking at the data to see what the data presented.

Q Is it your position, then, that for the purposes of regulatory action, as well as the action the HHCG took, that

the data only applies to the actual discrete point where it's taken, and doesn't extend out for a certain area around that point?

A The data is only valid for the point where it was collected. Then you can apply assumptions and interpretations and draw conclusions on which you derive clean-up actions. But the data is only valid at the point it was collected.

Q Well, doesn't the Type 3 sample data taken at a finite point have to be interpreted to cover a larger area, or you would have to take more Type 3 samples throughout CO-14; isn't that correct?

A I think you said the same thing I did. The data is valid at a single point. But then we can apply decision criteria and choose to apply it over a different area. In the case of the Type B samples, what was agreed with EPA is we would collect one Type 3 sample for each CDMA, and we agreed that we would use that one sample from a discrete point to represent that CDMA as far as moving forward.

Q Let me ask you about your alternate allocation calculation.

You have 100,000 cubic yards total, which you are saying would have to be dredged in the absence of chemicals. Is that what you're saying?

A I was asked to evaluate a hypothetical. And the

hypothetical was: If there were no chemicals associated with wood waste in the neck, what would the dredging cost be?

And I turned to the pre-remedial design evaluation and the documents generated therein that then estimated that associated with wood waste was 100,000 cubic yards of dredging volume.

Q Okay.

How much of that 100,000 cubic yards of dredging volume is from CO-14?

A I didn't do that analysis. Again, I was looking at the hypothetical. If you want me to talk about CO-14 actually, I did a very detailed allocation where I looked at it. This is a different exercise. This is a hypothetical, where I'm taking the -- I'm coming up with a hypothetical analysis that EPA says of 1998, go dredge wood waste. And so I'm taking the information that was generated for EPA, reviewed by EPA, reviewed by the Corps of Engineers, reviewed by Ecology. They reviewed these HWDS sites, they approved them, they approved the volume. And I used that information that is in the public record and approved by the agency to do this hypothetical. And I did not look at that hypothetical versus actual, because I've already done actual. That was my allocation that I talked about a few weeks ago. This is a hypothetical.

Q Okay.

Let me ask you about this, then. First of all, let's make sure it's clear. When you did this alternate allocation, you did not look at the Wood Debris Group consent decree to see what the criteria there were for where wood had to be cleaned up, did you?

A What I looked at is what EPA directed that had no criteria that said cleanup. And that is what I said --

Q I understand that. So the answer is no --

A -- I did not apply the Wood Debris criteria to that. I applied the EPA criteria that had been given to me.

Q That's my question. You did not apply the Wood Debris Group criteria to this alternate allocation exercise --

A No.

Q -- is that correct?

A No, I did not. That is correct.

Q Okay.

And you don't know what the results would be if you did apply the Wood Debris Group criteria to this alternate allocation exercise, do you?

A No. There is a lot we don't know because we don't have the data to do a lot of things, because we never gathered data with that intent. So there is a lot more that I don't know than I do know, because of the absence of the data on many topics.

Q Okay.

But let's look at your diagram here of the blue areas. These blue areas shown are the ones where that 100,000 cubic yards comes from, is that correct?

A That's correct.

Q So those areas include CO-14; is that correct?

A That's correct.

Q Does it include all of CO-14?

A It doesn't include the -- kind of the northwestern-most corner because that's by Kaiser Ditch and that was an area that, based on chemicals, had already been designated for cleanup based on chemicals.

Q All right. So can you approximate of the 42,000 cubic yards that the HHCG dredged in CO-14, how many are you including in your 100,000 cubic yard volume?

A If we look at that figure, and it includes all of CO-13, all of CO-14 except for a sliver, and includes area out in the waterway and it includes part of CO- -- maybe a part of CO-9.

And if we look at how much was dredged, CO-13 and CO-14 is about 85,000 yards. We probably had another 15,000 yards out in the waterway in that blue area, which makes it about 100,000 yards. And then we're going to subtract some of that sliver out, so let's take out another 10,000 yards. It's probably in the range of 90,000 yards, somewhere in that ballpark, when we add up the areas HWDS 1, 2, and 3, and then

back out the Kaiser sliver.

Q My question was for CO-14.

A Again, I don't have the graphics in front of me. I could do an analysis and get back to you on that. But, again, when I looked at it, the numbers seemed to be similar in what was actually dredged as compared to what we did here, because what we have is an offset. In the PRDE figure we have dredging out in the waterway, in the channel, as well, that wasn't included in the other part. And, again, I think that number of 100,000 is probably close to actual for the project.

Q Close to what was actually dredged in the blue shaded area?

A I think the 100,000 yards is not a lot different from the volume actually dredged, when you take a look at the blue shaded areas.

Q My question was, it's not a lot different from the volume that was actually dredged in the areas represented by the blue shadings?

A I think so, yes. I think that's what -- what I said is, in 1998, I estimated 100,000 yards of blue shaded area. When I think about -- and I haven't done a detailed analysis. When I sit here and think about the amount of material dredged from those areas, I think it's very similar. I think it's around 100,000 yards.

Q Okay.

Let's clarify, again, these areas. So we've established with CO-14, it's most of CO-14 except for this northwest corner sliver, correct?

A Correct.

Q And then you have some of CO-9, also included in here; is that correct?

A Yep.

Q And then you have some of CO-13 included; is that correct?

A I think it's all of CO-13.

Q All of CO-13 included. And you have some of CO-12 included?

A Possibly, yes.

Q Do you know how much of CO-12?

A I do not know.

Q Okay.

And then, do you have -- what is this one?

A Is that 7, there? Could be 7, I think, I'm not sure -- 7 or 8, I believe.

Q Some of 7 included. And then how about down here (indicating)? Is this 6 or 5?

A Again, it could be. It's -- that's probably 7, still.

Q Okay.

And do you remember how much volume you would attribute to each of these different areas? We talked about 14. How much

volume of the 100,000 cubic yards is in CO-9?

A You know, I really didn't do that analysis. I didn't do it.

Q Okay. That's fine.

So would your answer be the same, then, for the other blue-shaded areas, that you can't tell me how much volume is in there?

A What I said is I think the number, the total number, is real close to the same. 100,000 yards from 1998, I think, is very similar to the volume removed from those blue areas, actually.

Q Okay.

So then talking about CO-14, you're saying that when you talk about what is actually removed, you're talking about what was removed from the surface all the way down to the bottom, correct?

A That's correct.

Q In getting this volume, then, you are not subtracting any layer that might have been below wood; is that correct?

A And as I talked before, I don't think it's really possible to subtract the layer, knowing how dredging is done, knowing how the deposition occurred, knowing how we gathered the data, knowing the fallacies of the '71, '72 line that we've talked about, I don't think it's possible and so because it's not possible, I did not do it.

Q Okay.

And I didn't ask you if it was possible. I just asked you whether you subtracted a layer below wood?

A Right. And I explained to you why I hadn't.

Q Previously, when you testified earlier in this case, we did establish that the amount of wood you were finding at CO-14, at least you conceded that it diminished as you got lower, correct?

A Yeah. I said as it gets very low, much lower, it did diminish. That's correct.

Q Okay.

And it diminished beyond the point where you would need to clean it up under the Wood Debris Group criteria, didn't it?

A You know, I don't know. I mean, we didn't set the project up to dredge fallen criteria. And so I can't say if we did or not, because it's like saying to somebody, How fast did you go in Canada, in centimeters per second.

And you say, You know what, my speedometer was kilometers per hour, and I don't even know. I wasn't recording the data. It's pure speculation. And I'm not willing to speculate where I don't know.

THE COURT: Mr. Klein, we're going to take our break. About how much more time do you need?

MR. KLEIN: Well, I'll try and regroup and see if I can shorten it.

THE COURT: I am reminded of Coach Lombardi in this proceeding, primarily for the reasons that Mr. Fuglevand has expressed about you've got science generated for one purpose and people trying to extract from it information that proved their point, their predisposition, when it wasn't intended for that purpose.

I don't think we got enough data for a lot of these reasons, which is as I've been trying to say, I think when we get down to it it's going to be humble decision-making, rough justice, and I've heard a lot of bathymetry stuff in two trials now. And there sure is a hell of a lot of reliance on it for as inaccurate as everybody thinks it is. I don't want to -- my staff thinks I got too much patience. I sometimes think I don't have enough. We're just about out of time.

(Court in recess.)

THE COURT: You may continue.

BY MR. KLEIN:

Q Mr. Fuglevand, please look at plaintiff's Exhibit No. 780 which you went through earlier; do you remember that?

A Yes, I do.

Q If I understood you correctly, you were saying that the MCUL biological exceedances could be drivers at the cleanup; is that correct?

A Yes, I did say it.

Q Now, look at Station HY-24; do you see that?

A Yes, I do.

Q And you see these chemical exceedances for Station HY-24, correct?

A Yes, I do.

Q Now, let's put up Exhibit No. A-724. Okay. On here do you see Station HY-24?

A Yes, I do.

Q You see over here, where it shows the MCUL?

A Yes, I do.

Q Results?

A Yes.

Q And this is Dr. Floyd's figure from the other day. Do you see the TVS 6.15 percent?

A Yes, I do.

Q And are you aware that the background TVS in the Hylebos Waterway is 7 percent?

A It depends on what you mean by "background."

Q What do you think the background TVS in the Hylebos Waterway is?

A Well, when I typically look at background, I consider without the influence of site operations. So I've never agreed that the background of Hylebos is 7 percent TVS, because it's all been influenced by wood-handling activities. I think a more normal might be more in the 3 to 4 percent range. And 7 percent is a TVS that has a considerable amount

of wood waste already incorporated into it.

Q Well, 6.15 percent TVS, there, would not require cleanup under the Wood Debris Group criteria, would it?

A I'm not an experts on that criteria, sir.

Q Okay.

Let me ask you a question about natural recovery. And I'm not asking hypothetically, I'm asking real world.

What did you actually do to make any demonstration that any of the areas that were dredged in the neck qualified for natural recovery?

A I'm trying to understand your question. Could you repeat it to me once more?

Q Yeah. What did you or the HHCG actually do to make any demonstration that any areas in the neck qualify for natural recovery?

A There was a very extensive study done by the HHCG to look specifically at natural recovery. It was probably half-a-million to a million-dollar study. And it required the development of recovery factors for different parts of the waterway. So there were cores collected throughout Hylebos Waterway that were subsectioned on centimeter level. There was detailed chemistry profiling done. There was then the whole process of -- there was radioisotope dating to look at dating agents.

And from that there was an analysis that was developed for

recovery factors for different parts of the waterway. With those in hand, then, we were able to look at exceedance factors for chemistry, and look at whether or not it appeared that that chemistry would recover within a ten-year period throughout the waterway. So there was that level of analysis done for the site.

Q Did you get EPA approval that there were, other than the area in front of General Metals, that there were any other natural recovery areas in the neck?

A Well, in the PRDE report, it identifies several natural recovery areas. And it's one of the figures. And the ones that I recall, without having it in front of me, General Metals, there is one there, in front of there. There was the graving slip at General Metals. There was underneath the Weyerhaeuser dock. I think it's 1104, is --

Q I'm just asking about the neck.

A Okay. I was just thinking out loud. Excuse me. I have to recall. So I was thinking about the report we prepared and the areas we identified at the head. So I can think of two -- the graving slip and in front of General Metals are the two that come to mind, that were part of the report. And because they're part of the report, they were approved as such by EPA.

Q Right. So there weren't any other areas in the neck that you were able to qualify as natural recovery areas and get

EPA approval for that, were there?

A I wouldn't word it that way. I would say that there were -- in the final report there were two areas that were approved by EPA for natural recovery -- you know, in the neck. You kind of describe a much longer process that doesn't necessarily, you know, ring, so it --

Q Well, in the shipping channel, at the very least, there would be no way to do natural recovery there because of the heavy ship traffic; isn't that correct?

A No, not at all.

Q No, not at all. Okay.

Let me ask you this: If there no SQO exceedances in CO-14, then how much material would the HHCG have had to dredge there?

A None.

Q That's right.

If there was no wood in CO-14, then would you have had to dredge that area anyway?

A There were chemicals present, PAHs, that were also requiring cleanup in CO-14. PAHs, yes.

Q And also PCBs down near the bottom; isn't that correct, that were exceeding the 300 parts per billion SQO?

A No. The samples you're talking about are post-dredge samples. And that information wasn't known at the time the decisions were made on clean up. The data that we had at the

time decisions were made showed that PAHs were the only driver for cleanup. And so at the time -- by a driver, it's the information used to make a decision. And at the time that the cleanup decision was made, all of the core data, as I've shown, showed only a very minor PCB issue and a very minor arsenic issue. And so if you had taken away all the PAHs, neither the PCBs nor the arsenic would have required cleanup in CO-14.

Q Well, that's a definition of driver. But if you think of driver as being what actually happened in the real world to take you down to the where you ended up going, then it would be those Type 3 sampling results that you had to pass; isn't that correct?

A But that's not -- when I'm speaking of driver --

Q No, but under my view of driver, what I just said; isn't that correct?

A Well, again, I don't agree with your views, so I'm not going to agree with your position. I have a very clear definition of what a driver for a cleanup is.

Q I think the point been made. Thank you.

THE COURT: Mr. Myers?

REDIRECT EXAMINATION

BY MR. MYERS:

Q One question, Mr. Fuglevand. When the Wood Debris Group did its cleanup in the Upper Turning Basin, how deep did the

Wood Debris Group dredge?

A I understood they dredged to native.

Q So they dredged all the way down to native, also. Not to some artifical layer; is that correct?

A That's correct.

MR. MYERS: No other questions.

But, Your Honor, I would like to admit the exhibits. They are Exhibit Nos. 780, 781, 782, 783, 784, 785, 786, and Exhibit No. 765.

MR. KLEIN: No objection.

THE COURT: Okay.

MR. MYER: And, Your Honor, there's one other one. It's the statutory warranty deed for the TEF property, Exhibit No. 11. It was also included in our summary judgment materials. We would like to move to admit that.

THE COURT: All right. Exhibit No. 11. Any objection?

MR. COLDIRON: No.

THE COURT: Exhibit No. 11, 780, 781, 782, 783, 784, 785, 786 and 765 are admitted, to include Exhibit No. 11. Any others from the Weyerhaeuser side?

MR. KLEIN: No, Your Honor.

THE COURT: All right.

MR. MYERS: Plaintiff's close.

THE COURT: Mr. Fuglevand, you may stand down. Thank

you very much, sir.

(Testimony concluded.)

C E R T I F I C A T E

I, Nichole Rhynard, CCR, CRR, RMR, Court Reporter for the United States District Court in the Western District of Washington at Tacoma, do hereby certify that I was present in court during the foregoing matter and reported said proceedings stenographically.

I further certify that thereafter, I have caused said stenographic notes to be transcribed under my direction and that the foregoing pages are a true and accurate transcription to the best of my ability.

Dated this 18th day of July, 2007.

/S/ Nichole Rhynard

Nichole Rhynard, CCR, CRR, RMR

Official Court Reporter